UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

DATE: July 31, 1998

SUBJECT: Biological Technical Assistance Group Review

Onondaga Lake RI/FS Baseline Ecological Risk Assessment
prepared by Exponent dated May 1998

FROM: Biological Technical Assistance Group (DESA-HWSB)

TO: Alison Hess, Remedial Project Manager

Special Projects Branch (ERRD-SPB)

The following comments represent the consensus of the Region II Biological Technical Assistance Group (BTAG) review as discussed during the meeting of July 23, 1998. The document reviewed by the group was the "Remedial Onondaga Lake RI/FS Baseline Ecological Risk Assessment prepared by Exponent dated May 1998.

General Comments

A primary concern of this Ecological Risk Assessment report is the fact that only the top two centimeters of sediment (less than 1 inch) were used to evaluate the surficial sediment chemistry. The Biological Technical Assistance Group (BTAG) generally recommends using the top 6 inches (we have made this comment before at this site). The benthic macroinvertebrates (oligochatets in particular) are commonly known to turn over as much as the top 8 inches of sediment in a lake. While the BERA documents why the authors believe the top 2 cm is acceptable, the BTAG maintains that to evaluate the risk and the <u>potential risk</u> from contaminated sediments that the top 6 inches should be used. There is the potential in most instances for various disturbances (including biological reworking of the sediments) to either re-expose contaminated sediments or to concentrate the contaminants from sediments as deep (or deeper) than 6 inches, and make them available to higher trophic level receptors.

The development of Onondaga Lake sediment quality values (OLSQVs) is questionable for various reasons. There may not be enough data to support this approach for all of the stressors of concern (SOCs) in Tables 5-2 and 5-3, especially if the data are subjected to correlations or regression analysis and the biological effects used to set most of the organic contaminant OLSQVs were toxicity/biomass tests for "primary" values and the benthic community data for "secondary" values (page 5-45). This information should be presented on a case by case basis with the appropriate calculations. All of the metals rely on acute and chronic toxicity testing to set the OLSQVs. With only two species examined in a laboratory setting (pgs 5-40 thru 5-44), it may not be sufficient to ignore the fact that the values are often more than an order of magnitude above the Ontario sediment screening guidelines. For the metals, the "secondary" OLSQV developed is always closer to the Ontario SEL (exceeding it in some cases) than it is to the LEL. The authors attributed the very high screening values to high AVS and TOC concentrations which are a result of current anthropogenic sources to the Lake. Also, if the AVS varies independently of the metals concentrations could we find areas of the lake where the metals are present at toxic concentrations yet are screened out because of high AVS that may be present at other locations. With reduction of the sewage contamination to the lake AVS or TOC concentrations may decrease substantially and in turn may significantly lower the proposed OLSQVs. In order to more accurately evaluate the OLSQVs, the calculations for each chemical, including community and toxicity data, should be made available along with an evaluation of the specific factors that may have caused the large discrepancy between commonly accepted values (Ontario and NOAA values). Where appropriate, these data should be statistically treated.

The limitations of using site-specific sediment values should be recognized and pointed out (e.g. it doesn't address potential synergistic or additive toxic effects). In many cases, this type of approach, coupled with correlations or regression analysis (which apply here due to the volume of data), is a powerful evaluation tool, and better than the approach used.

The toxicity testing (pgs 5-40 through 5-44) and the benthic community analysis are used to set the OLSQVs and then are in essence used to support the values. The statement on page 6-48, "The independent information provided by each of the environmental indicators used in the BERA (i.e., sediment chemistry, sediment toxicity, and evaluations of benthic macro invertebrate communities) provides a more integrated assessment than would be possible using any single indicator", is misleading in that they are not necessarily independent unless they are evaluated as such - the sediment chemistry against the Ontario numbers; the toxicity against the control; the benthic community against the Reference stations. Since the toxicity tests and the benthic community data are used to develop the OLSQVs which in turn are used to evaluate the sediment chemistry, it is hard to consider these fully independent evaluations. It is acceptable to indicate the combination is better than any one of them. There may be a better way of looking at them independently.

The risk assessment should include a comparison of fish tissue concentration results to levels considered to cause adverse effects in fish. Since Onondaga Lake fish are a receptor of concern, this comparision can determine if the site-related contaminants are causing adverse effects in the fish.

There was no evaluation of PCBs in the water column. Was this because none were found or because they were not measured? If there were PCBs present in the water column, an evaluation and comparision to the most current State criteria should be performed. If this parameter has not been measured, it should be.

Ecological risk calculations to upper trophic level receptors should be developed for all the CERCLA contaminants (stressors) of concern. The non CERCLA "stressors of concern" (eutrophication related variables, wave action, exotic species, etc.) are important factors in the lake, as they are in most lentic ecological systems, but they are not the primary issue at a NPL Site. They should be placed in appendices. It appears that more effort was placed on these variables than on CERCLA contaminants. Because of the evaluation of CERCLA contaminants and the use of related definitions the term "risk" for these non CERCLA stressors is probably not appropriate.

The food chain models and assumptions are inappropriate in numerous instances. For example, the area use factors for pisciviorous birds should be set at one. These birds nest along the shore of the lake and the hatchlings may be fed a diet exclusively from the lake for the early part of their life. This is a large system and it could well provide the primary food source -if not the only food source- for these receptors over a substantial portion of their lives (as already noted including the reproductive period). The reason some of the receptors (osprey and the cormorant) are not on the lake may be related to the contamination. Thus the argument that they currently do not nest on the lake or in close proximity is not valid.

Some other examples follow:

> The home range of a Great Blue Heron is huge in comparison to areas where they preferentially feed. Diluting the dose by use of a large home range is inappropriate. EPA (1993) estimates foraging territory as low as 0.6 +/- 0.1 ha. Likewise, the total foraging area and total foraging habitat determinations on page 4-79 are inappropriate. The models should remain conservative while incorporating site-specific data, and at a minimum should be rerun with consensus parameters.
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> "Time of use" weighting may be an appropriate approach, however the summary of the toxicological literature used for the dose calculations does not have sufficient detail to determine if this factor should be included, or has been applied appropriately.
>
> There does not appear to be an incidental sediment ingestion component to the dose equations. The relatively high contaminants concentration in the sediments likely increases the total dose to the receptors.

Food web analysis for aquatic species is missing from the report. Potential risks to benthivorous and piscivorous fish should have been calculated since they are exposed to the contaminants of concern through direct contact with surface water and sediment and through ingestion of contaminanted food items.

The food chain models need to be revised and rerun with all calculations being shown in an appendix.

The BERA uses the value of 1.4 ug/l to evaluate the risk from mercury. This value is the NYSDEC and EPA Water Quality Criteria for protection of aquatic receptors from acute (survival) effects. The chronic value for aquatic receptors is 0.77 ug/l and the value to protect wildlife is 0.0026 ug/l (NYSDEC proposed) and 0.0013 ug/l Federal Promulgated (40 CFR 9, 122, 123, 131, and 132 Final Water Quality Guidance for the Great Lakes System; Final Rule). The document must address risk to wildlife using these latter numbers (State or Federal) and address risk to aquatic receptors using the chronic criterion.

Based on a relatively quick review of the benthic community data in the RI/FS and the toxicity data as reported in this document, there appears to be significantly more risk to the benthic community than is stated in the conclusions section of this document (Section 7 of the BERA). The benthic community is clearly and substantially impacted in the southern and southwestern section of the lake. This is likely not from the eutrophic SOCs. Benthic community impacts also correspond fairly well with the toxicity data. In the deeper sections of the lake, any impact from contaminants may be masked by the eutrophic conditions of the lake. The transfer of contaminants up the food chain may be significant.

As the BTAG and the Service have continually contended, the Lake, its tributaries and the associated wildlife in the immediate vicinity of these waters should be evaluated holistically.

Specific Comments

1. Page xxv, top of the page - There is a lack of references in the discussion of *C. dubia* and *D. magna*.

2. Page 2-10, Section 2.2 - The site history section should better detail the locations of historical industry and other inputs to the lake. Some very clear trends are shown in the southern and southwestern parts of the lake, and it would be nice to see the spatial relationships between historical use (other than the waste beds) and areas of the lake consistently shown to be degraded.

3. Page 3-8, Table 3-2
   a. The assessment endpoints are too broad; they should be more specific and better relate to the measurement endpoints.
   b. Measurement endpoints for fishes should also include exceedances of TRVs and the measures of exposure should include SOCs in tissue as well as water.

4. Page 3-12, Table 3-3 - As illustrated here and other places in the text, an attempt was made to use fish fillet data to give whole body levels of PCBs, other TAL and TCL chemicals, and methylmercury in several species of fish in Onondaga Lake. Unfortunately, the data on which these conversions (see Section 4.3.3) are based exhibit many values that were estimated or undetected(see Appendix D). Therefore, the degree of uncertainty that has been incorporated into these calculations renders the resulting whole body burden estimates very uncertain, to a degree that we should question their use.

5. Page 4-10, Table 4-2 - The wetlands discussed here and shown in Figure 4-5 comprise only the New York State-regulated wetlands in the vicinity of Onondaga Lake. Unfortunately, this does not include any wetlands smaller than 5 hectares (12.4 acres). Executive Order 11990 (Protection of Wetlands) and the EPA's 1985 Policy on Wetlands and Floodplains Assessments for CERCLA Actions require that we delineate and assess impacts for all Federally-regulated wetlands, for which there is no such size limitation. Therefore, the report does not adequately describe or calculate the habitat use by the various receptor species. To attempt to perform an analysis of effects of contaminants on benthic biota, fish, birds, and mammals without utilizing information that will provide a realistic model in terms of feeding strategies and other habitat uses, is to decrease the value of that analysis and to cast doubt on the validity of any bioaccumulation factors that are developed to derive ecological risk numbers for the receptor species identified in the report. The Responsible Party needs to delineate the additional wetlands and reassess the impacts to the food-web.

6. Page 4-23, Table 4-5 - The only Oligochaeta Tubificidae species identified were *Limnodrilius hoffmeisteri and L. cervix.* These are both very tolerant species. Consideration should be given to the fact that the Tubificid oligochaetes are generally intolerant to metals contamination.

7. Page 4-25, Rare, Threathened, and Endangered Species section - The U. S. Fish and Wildlife Service must be consulted regarding the presence of Endangered Species.

8. Page 4-34 - High flow events are common in the system. A single high flow event was judged to bias the monthly average mercury concentration on this page. Therefore, high flow events should be carefully evaluated.

9. Page 4-70, Table 4-12 - Whole body concentrations of methylmercury should be higher than the concentrations in fillets since the whole body samples contain more lipids.

10. Page 4-71, Figure 4-31 - There are at least 3 more common regression models that would fit the data equally well, if not better. There are too few points to make the determination that was made; intermediate fish lengths are necessary.

11. Page 4-72, Figure 4-32 (see comment above). In addition, the upper two points in each determine the regression.Intermediate (and more) points are necessary to propose these models.

12. Page 4-73, Table 4-13 - Extrapolation from fillet concentrations of methylmercury to whole body should be avoided. Whole body concentrations should be used. Extrapolations would not be necessary if whole body-worst case numbers were used. At a minimum, calculations need to be shown.

13. Page 4-75, Table 4-14 - Rather than modeling size classes, prey preference, and doses, why not use worst case scenario across appropriate sizes for each receptor?
14. Page 4-80, Section 4.3.10.2, 3rd ¶, 4th sentence - The USEPA Wildlife Exposure Factors Handbook, 1993 states that kingfishers take fish that range between 2.5 and 17.8 cm. As Table 4-14 illustrates, larger size fish contain higher concentrations of mercury and PCBs; thus the amount of contaminant ingested by a kingfisher would be greater and their potential ecological risks would be higher.

15. Page 4-92, Table 4-20 - This table presents exposure values for Great Blue Herons that seem to be based on the assumption that these herons would be feeding in Onondaga Lake, and that the "mean fish concentration" is an appropriate value for feeding. However, this does not provide the "conservative" value that EPA normally would advocate. Should not the higher range values be used as a "worst case" situation? In support of this assumption, it appears more likely that herons would be feeding in wetlands areas, where the substrate includes sediments with higher TOC and more fines than the lake shore. Since PCBs and metals would preferentially adsorb to such sediments, it should be ascertained what the COC levels are in these sediments that fish and shellfish would be ingesting and inhabiting. If fish body burdens in these areas are higher than in the open lake, the values for the heron will need to be recalculated.

16. Page 5-1, Section 5, Effects Characterization - The statistical methodologies used to describe relationships of effects were not discussed in any case. The following questions arise from this:

A) Why is linear regression appropriate?
B) Are the data normally distributed?
C) Were any transformations of the data necessary?

17. Page 5-6, Section 5.4.1, 4th ¶

a. The authors claim that metal concentrations in the upper 2 cm of sediment are representative of the upper 10-15 cm, but Figures 5-1 and 5-2 suggest that this is not true for chromium, copper, and zinc at 15 cm.

b. Are there any data to support the claim that several centimeters of "clean sediment" have been deposited since 1992? At estimated sedimentation rates of 0.8-0.9 cm/yr, presumably 4 to 5 cm of new sediment has been deposited since 1992. Therefore the "upper 2 cm" data present here is now @ 4-6 or 5-7 cm, with sediment of unknown quality above. Meanwhile the authors cite numerous studies to justify using the upper 2 or 4 cm for the ERA and to make remedial decisions.

18. Page 5-21, 2nd ¶ - Does Cross Lake have any sources of contaminants to it? If so, these sources should be described in the report.

19. Page 5-42 - By defining primary and secondary OLSQVs as survival or biomass impacts as noted on this page the value of this approach is in question. It seems as if toxicity and biomass tests were from the same test. It is questionable if this dual data - especially without a life cycle test (Ceratodaphnia) to back it up - is sufficient to differentiate between the OLSQVs - especially in that only the more hardy individuals would be weighed if mortality claimed a portion of the test population. An expert in this field should be consulted to validate that what was done was in fact acceptable for the purpose for which it is being used.

20. Page 5-45 - The case for AVS is overstated. With a SEM to AVS ratio of less than 1.0, toxicity due to the divalent metals is not *necessarily* predicted because the AVS may bind with the SEM. They imply it is a certainty.

21. Page 5-49, Section 5.6 - There is much more dietary TRV data available for mercury and PCBs in mammals and birds that should be presented or reviewed in the selection of the ones currently used in the risk calculations. This may better help the reader understand the range of concentration versus effect information, and thereby determine if the ones

chosen are representative.

22. Page 5-50 - Additional TRV data for methyl mercury should be evaluated. The use of a LOAEL rather than a NOAEL should be avoided. If it is necessary, a protective factor should be incorporated. When this work is redone it should also include calculations for total mercury - in addition to the methyl mercury.

23. Page 5-52 - Is there any data available for Aroclor 1260 which is present?

24. Page 6-2 - It is inappropriate to switch from chronic to acute water quality exceedances in the same discission. All discussion should start with chronic exceedances and then include acute exceedances if any exist. As the discussion proceeds, it should be clearly stated if the discussion is of acute or chronic. Table 6-2 should be modified to reflect this. If high flow events are thought to justify putting more emphasis on the acute criteria - then it should be so stated. At the same time, the frequency and duration of these events must be discussed, as should the potential for them to cause negative impacts on the ecological receptors over the same periods.

25. Page 6-1, Section 6.1.1. - The logic and appropriateness of comparing high and low flow concentrations to acute and chronic water quality criteria, respectively, should be evaluated. My guess is that high flow events are relatively common and relatively long-lived. What was the time frame in the determination of the acute and chronic criteria, and how does this compare to conditions in the lake? This should be more fully discussed.

26. Page 6-19 - Prior to accepting the conclusions in Section 6.1.2, the OLSQVS will have to be accepted. It may be appropriate to look at values between the OLSQVS and the Ontario guidelines. It may be worth the effort to re-evaluate this data using the Ontario guidelines and see how much difference there is in the conclusions. If there is little change, then some effort may be saved on reviewing the assumptions upon which these data are built.

27. Page 6-20, Section 6.1.2.1 - While the number of stations exceeding Onondaga Lake Sed. Quality Values (OLSQVs) is provided, perhaps the estimated lake bottom area (sq. ft) exceeding OLSQVs can also be provided, as a prelude to Feasibility Study remedial alternatives discussion. For example: approximately what acreage of lake bottom exceeds 5.5 ppm mercury?

28. Page 6-41, Section 6.1.3 - Food chain calculations are summarized, but not presented in total, making an audit of the risk conclusions difficult. Calculations and determinations based on total mercury should also be included.

29. Page 6-43 - The first full sentence on the page should be modified from “A hazard quotient less than 1.0 indicates the absence of risk.” to “ A hazard quotient less than 1.0 indicates that risk is unlikely.” The second sentence should be modified by adding as noted “A hazard quotient greater than 1.0 indicates that *there may be risk in that* the exposure of the modeled individual has exceeded the TRV.”

30. Pages 6-43 and 6-45 - See comments in the General Section regarding the assumptions made about the Double-crested cormorant, great blue heron, and the osprey.

31. Page 6-49, Section 6.2.3.1. - The use of average or median estimates of SOCs is generally not appropriate in a BERA. Generally, to be conservative, the maximum value is used. Also, It does not appear that conservative

species-specific exposure estimates were used (see comments above). In general, the exposure estimates were unacceptably liberal. With the size of the Lake it may be appropriate to consider the upper 95% confidence limit for each SOC.

32. Pages 5-50 and 5-51 - Based on the enormous amount of work done on this project, the use of models to project the concentration of SOCs in whole body fish could have been avoided. Conversions from fillet data to whole body data and then to a different size via modeling should require some safety factor built in. Perhaps this could be remedied with actual data as soon as possible.

33. Page 6-51,

a. 2nd ¶ - The statement should be added to the end of this paragraph that the assumption that both environmental and tested forms of a chemical are not necessarily absorbed with the same efficiency and that in some cases wild populations seem to accumulate more than laboratory populations in the same concentration. This could be made clearer.

b. last ¶ - The use of 100% fish in the diet of mink is a conservative decision. If it is changed, then the most conservative listing in EPA's Wildlife Exposure Factors Handbook should be used. The same holds true for the other species used in the analysis. In each case the concentration of CERCLA SOCs (COCs) of these food sources would have to be determined.

34. Page 7-1, Section 7.2 - There is clear evidence from the sediment toxicity test results displayed in Figure 5-22 that there are toxicity problems near Harbor Brook, East Flume, Tributary 5a, Metro, and midway between 5a and Ninemile Creek; Likewise, there are alterations of the benthic community at Harbor Brook, East Flume, Tributary 5a and Metro. However, Section 7.2 of the conclusions states that:
A) The only widespread risks in sediment result from ammonia and sulfide - which is false.
B) Metals and organic compounds pose risk to the benthic community in the southern part of the lake but this area only comprises a small percentage of the lake bottom. This is also false given that low DO conditions in the deeper sections of the lake limit available habitat, and the observed problems off of the southwestern shore.
C) Many tolerant benthic species can survive in poor conditions and the determination that fish populations have not been affected in those areas, because benthic species are present and therefore, fish can still forage, is not appropriate. The data shows that there has been a disturbance of the benthic community in those areas. Benthos that are present in those areas may bioaccumulate contaminants, creating other concerns.

The BTAG is interested in reviewing any future documents pertaining to this site. If you have any questions, comments, or require further information, please contact Gina Ferreira at (212) 637-4431.

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